

## **JOHNSON & CARLSON**

**848-864 EASTMAN STREET**

***Builders of Better Tanks and Vats Since 1893***

**Telephone Area 312, MOhawk 4-1580**

**Chicago, Illinois 60622**



# TABLE OF CONTENTS

Page 1 .....	Forward
Page 2 & 3 .....	Food Products
Page 4 .....	Air Pollution Control
Page 5 .....	Lumber Selection & Paper Ind. Tanks
Page 6 .....	Brewery Tanks
Page 7 .....	Vinegar Storage Tanks
Pages 8 & 9 .....	Tannery Equipment
Page 10 .....	Concrete Bottom & Wood Stave Tanks
Page 11 .....	Stave and Bottom Table
Pages 12 & 13 .....	Gravity Tank & Dome Covers
Page 14 .....	Wood Tank Specifications
Pages 15, 16, & 17 .....	Rectangular Tanks, Design & Construction
Pages 18 & 19 .....	Miscellaneous Products
Page 20 .....	Thermal Insulation
Page 21 .....	Corrosion Resistance
Pages 22 & 23 .....	Vinyl Tank Liners
Page 24 .....	Capacities of Round Tanks



## Foreword

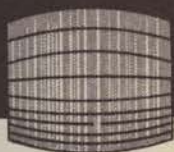
Wood tanks have long met engineers' requirements for dependable service and excellent performance in the industrial life of this country. The very nature of wood as a structural and fabricated product lends itself to the manufacture of tanks.

In a small book of this kind, it is possible to show only a small part of the tank work and accessories designed and built by our organization. It has always been the policy of this company to make our work the best of its kind and by furnishing a superior grade of goods, make our customers our friends and merit a continuance of their patronage.

Our contention has been that there will always be a demand for the best and it is to that demand we cater. Most of our business is done with constant users of wood tanks who buy from us repeatedly, year after year and who have learned by experience to discriminate between our tanks and the cheaper and shorter lived tanks so often offered.

To the man who knows, there is just as much difference in tanks as there is in food, clothes, automobiles or any of the every-day things of life which are seldom purchased on price alone.

The fast pace of evolutionary change is making its impact on the wood tank industry. We therefore consider it our obligation to fully acquaint engineers and other authoritative groups in the vast new industries requiring wood tanks with authentic technical data as well as factual information as to why and how wood tanks continue to serve modern industry with the same dependability as has been experienced for countless decades.

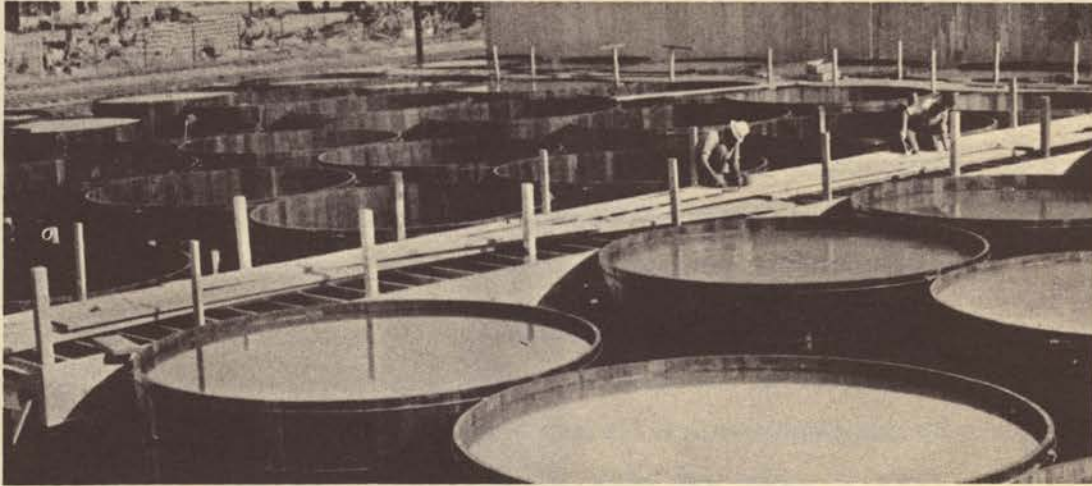


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# FOOD PRODUCTS



## Cherry Processing

Wood tanks are now used in an early stage of processing cherries. Cylindrical tanks of 10,000 gallon capacity and up, fitted with a reasonably tight flat cover, are used. The tanks are filled with an aqueous solution containing 1-2% sulfur dioxide. The stemmed cherries are then bleached in this solution for approximately a month, after which time the processing is continued.

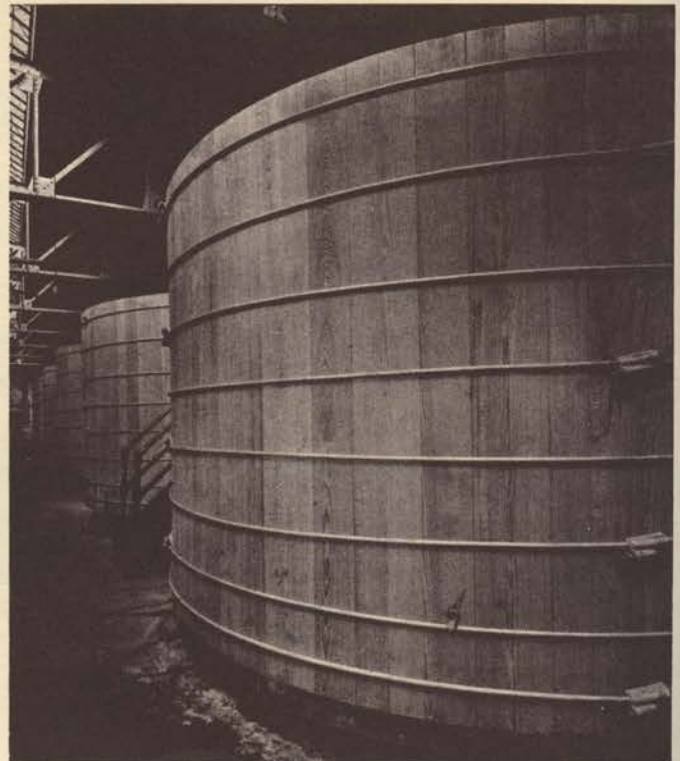
## Vinegar, Pickles, Olives and Cider

These foods are processed and stored almost exclusively in wood tanks. The acetic acid of vinegar has no deleterious effect on wood nor does brine in which pickles are packed. The brine and low concentration of lactic acid used in olive processing does not affect the wood adversely. Service of more than 30 years is expected from tanks processing these foods while records show tanks which have been in constant use for more than 50 years. While Douglas fir may be preferred for distilled vinegar tanks, much redwood is used for fermented vinegar tanks.

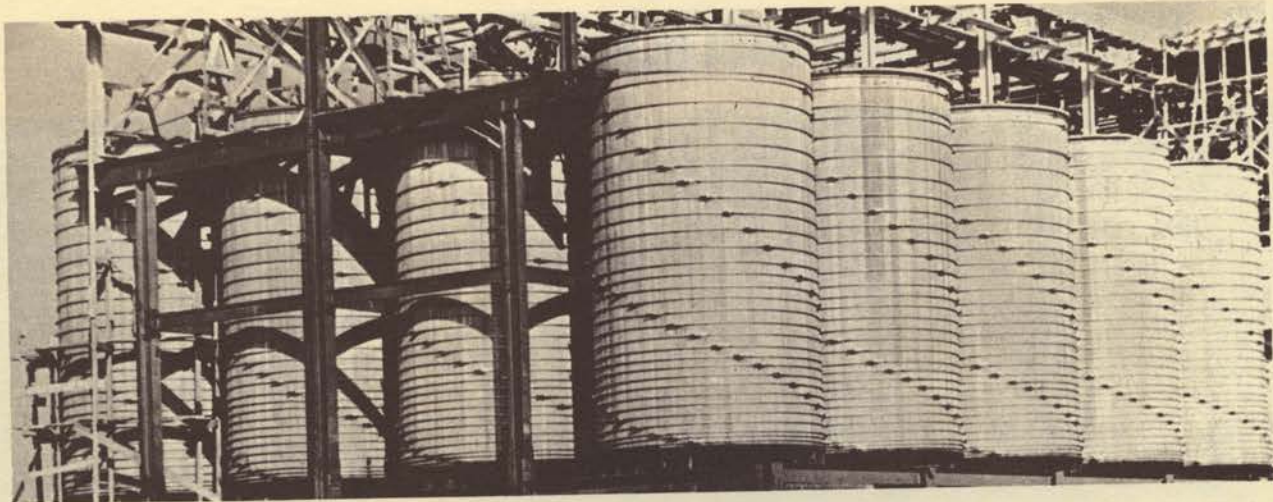
## Food Products

Douglas fir, cypress, redwood and western red cedar have had wide usage in food technology. Mustard processing is a good example. The seed of mustard is ground to a fine paste with vinegar, salt and spices. The acetic acid of vinegar and the brine have a strong corrosive effect on any steel which may be in the vicinity. Hence, the fumes over mustard are very corrosive; adequate ventilation is required.

Wood tanks are the ideal material for tanks in this process, because wood is not affected. However, care should be exercised in selecting fittings as the decomposition of the active ingredient in mustard, allyl isocyanate, is catalyzed in the presence of water, copper, silver or tin to allyl cyanide and sulfur. The sulfur then reacts with the metals to form their sulfides. Many cyanides are toxic; thus brass, bronze, regular steel or alloys containing any of the above metals should be avoided.



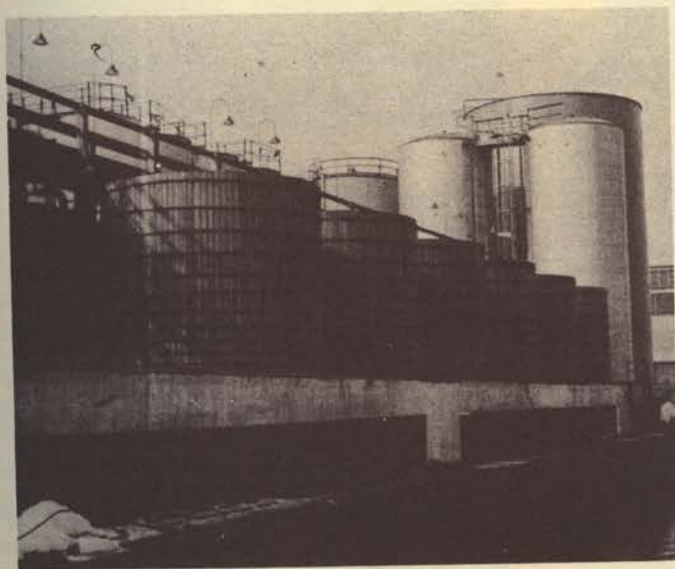




-20 wood stave steep tanks for a products refining company.



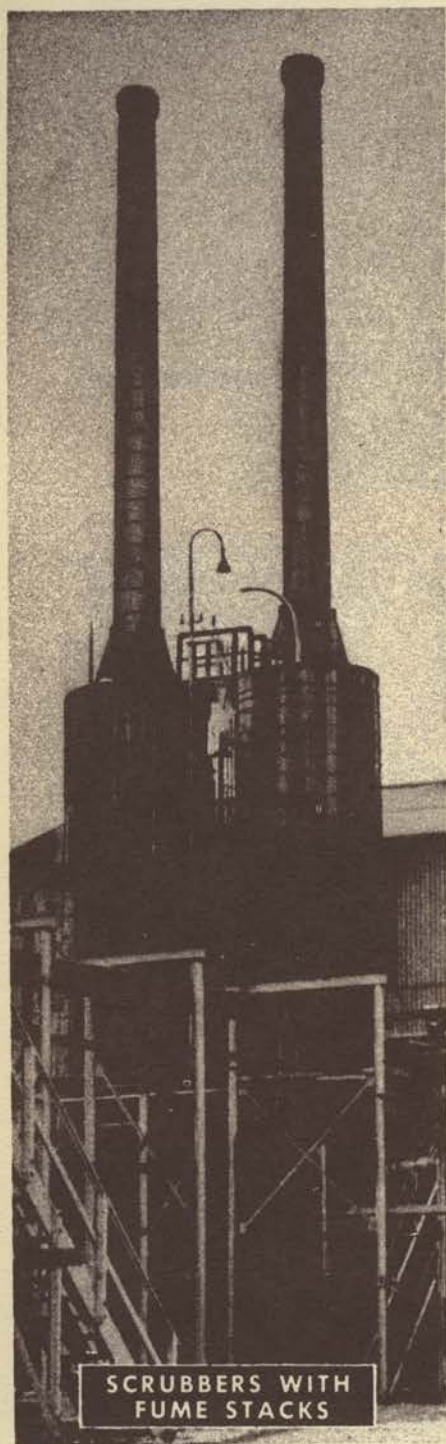
TANK CARS.



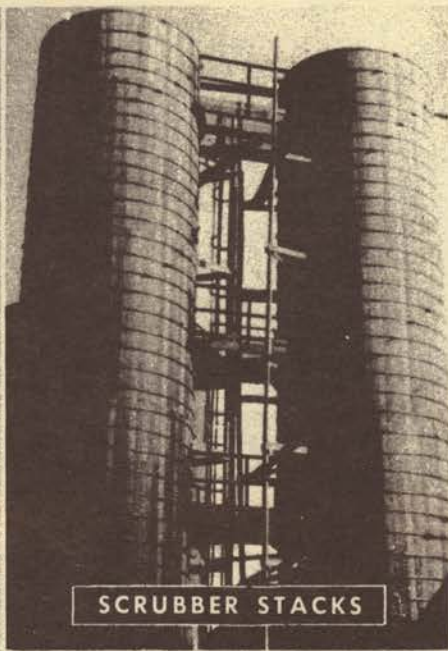
A battery of tanks made of 4" tank grade fir for fatty acid for the Soap Industry.



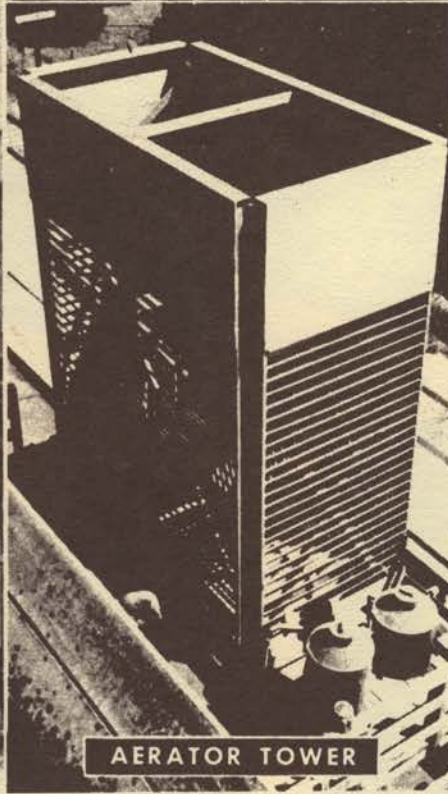
# AIR POLLUTION CONTROL



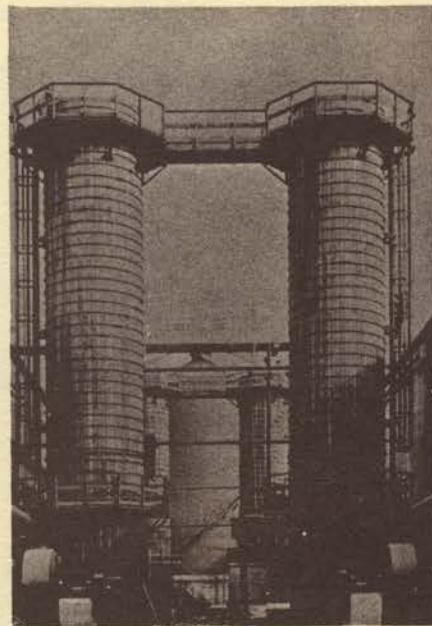
SCRUBBERS WITH  
FUME STACKS



SCRUBBER STACKS



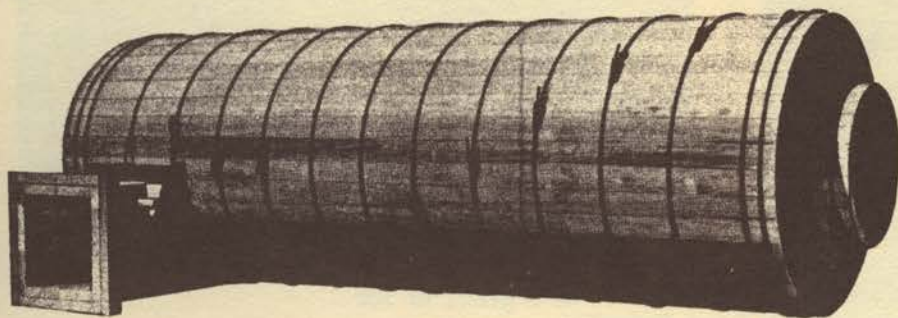
AERATOR TOWER



A group of 64 Redwood cylindrical, wet  
gas washers, 3" Redwood, 10' ID x 60'  
stave.



Wood stave de-gasifier



Gas scrubber

## Air Pollution Control

Wood tanks have been finding increased usage for installations designed to remove obnoxious fumes, dust or chemicals from gases.

Wood has proved its superiority over other construction materials for scrubber or aerator tanks. Water is used in scrubbing the gas. Sulfur dioxide will combine with water to form sulfurous acid. Carbonic acid from carbon dioxide and other fumes will be diluted by water. Wood is resistant to most acids and other solutions when dilute, whereas many substitute materials corrode readily in the presence of even minute amounts of these same dilute acids. The growing concern of municipalities over the problem of the discharge of gases by industrial plants is stimulating a large demand for wood tanks and wood air ducts for this particular application.

JOHNSON & CARLSON



# LUMBER SELECTION

We carry in our yards a large supply of 2", 3", and 4" Cypress, Redwood, and Fir, suitable for tanks up to and including one hundred thousand gallons capacity. A wood tank is the best container for water and many other liquids and we are prepared to furnish wood tanks of any shape or size designed to meet your requirements.

## "CYPRESS"

Cypress is called "The wood eternal" and has in our opinion no equal from which to build tanks and vats. It has resistance to rot, has great durability, does not swell or shrink as much as other woods, and will not give off any taste, color or odor. Our Cypress is the genuine "Tank Grade Tidewater Red Cypress" which is the best quality obtainable, more expensive, and better suited to tank purposes than any other grade. We wish to caution purchasers of Cypress tanks to insist on nothing but the best. The words, "Cypress Tank" in themselves do not mean anything. The tank must be well made and of the best quality of Cypress such as we use exclusively. Too often a buyer uses the general term "Cypress Tank" in his inquiry and then buys on the low bid. The word "Cypress" is then found to cover a multitude of sins. It is better to use an excellent grade of a cheaper lumber than a lower grade of Cypress. A tank, like a chain, is no better than its weakest link.

## "REDWOOD"

Our clear, "tank grade" California Redwood tanks have proven so satisfactory that our sales of tanks made from this particular lumber have increased significantly. The lumber contains a natural preservative which protects it from rot and decay;

it is practically free from warping and shrinking, difficult to ignite, and slow burning. It has good lasting qualities, is readily available particularly in longer lengths and is much less expensive than Cypress. The question is often asked if Redwood doesn't discolor water or other liquids. Redwood tanks have been used for years in the wineries of California for the storage of white wines. After a Redwood tank has been filled and emptied several times or if necessary, neutralized, it is considered one of the better containers for almost any liquid.

## "FIR"

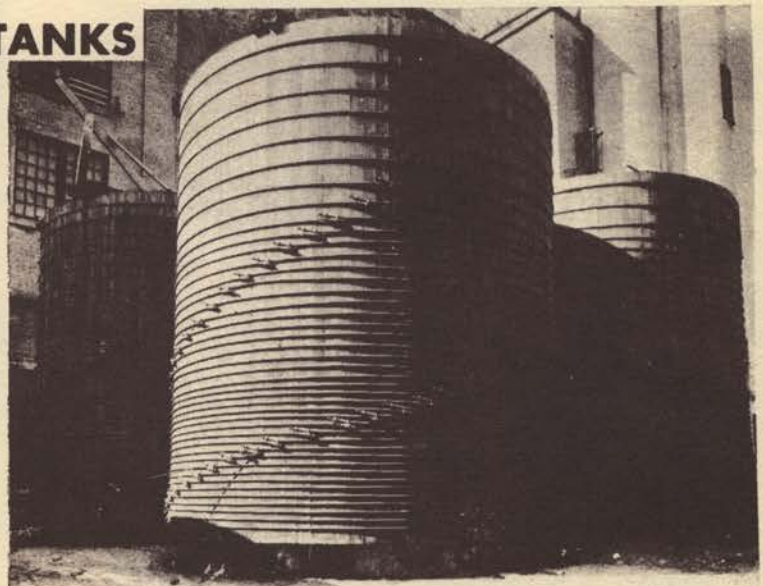
We use nothing but "Tank Grade Oregon Douglas Fir" in our tanks. This is the best quality of Fir possible to procure for tank purposes. It is a very strong, fine looking lumber and costs less than either Cypress or Redwood. It is available in extremely long lengths and probably more commonly used for making tanks to hold pickles, kraut, vinegar, and brine solutions than any other lumber.

## "YELLOW PINE"

Our yellow pine is of the Long-Leaf variety, heavy in pitch content, durable, and available in greater thicknesses which make it an ideal lumber to use in the manufacture of industrial tanks such as pickling and spent acid storage primarily used in the Paper Mill Industry.

## PULP AND PAPER INDUSTRY TANKS

Wood tanks are used for storage of water, for water treatment, pulp storage, agitator and mixing tanks and treatment of waste. Cypress, redwood, white cedar, yellow pine, Douglas fir and northern white pine have all found application in this industry for most of the paper mill tank applications. The type of lumber selected is that which is indigenous to the paper mill location. The diameter of some of these tanks varies from 40 to 80 feet and service of 20 to 30 years is expected.



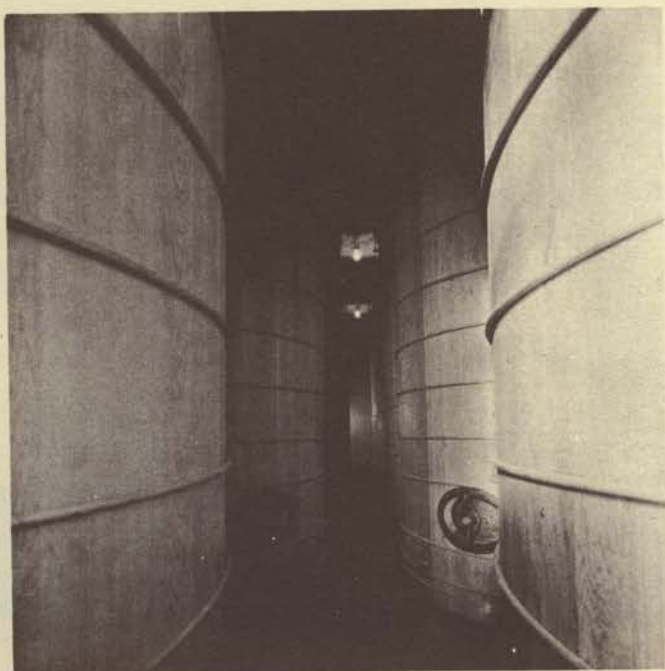
Redwood tanks used for storing sulphite liquor.



# BREWERY TANKS

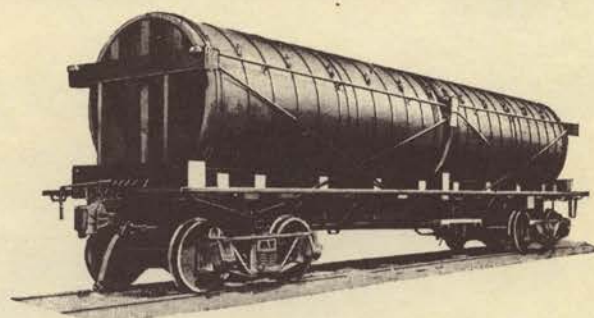
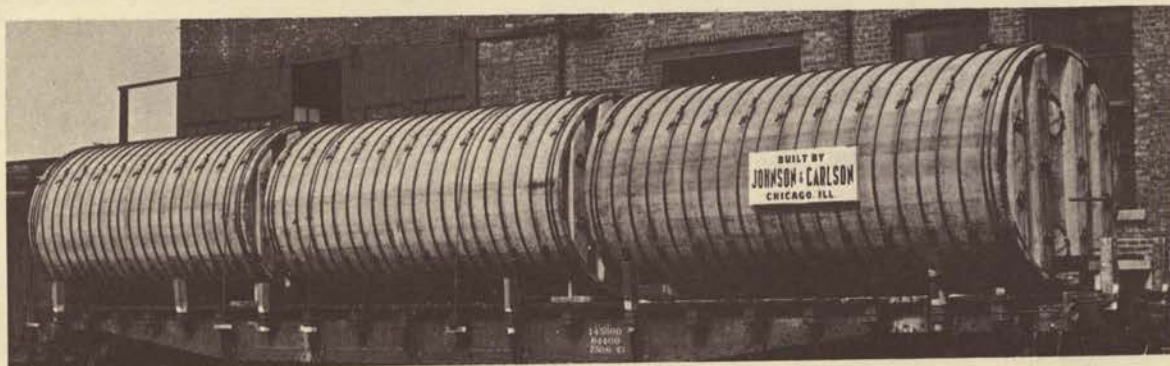
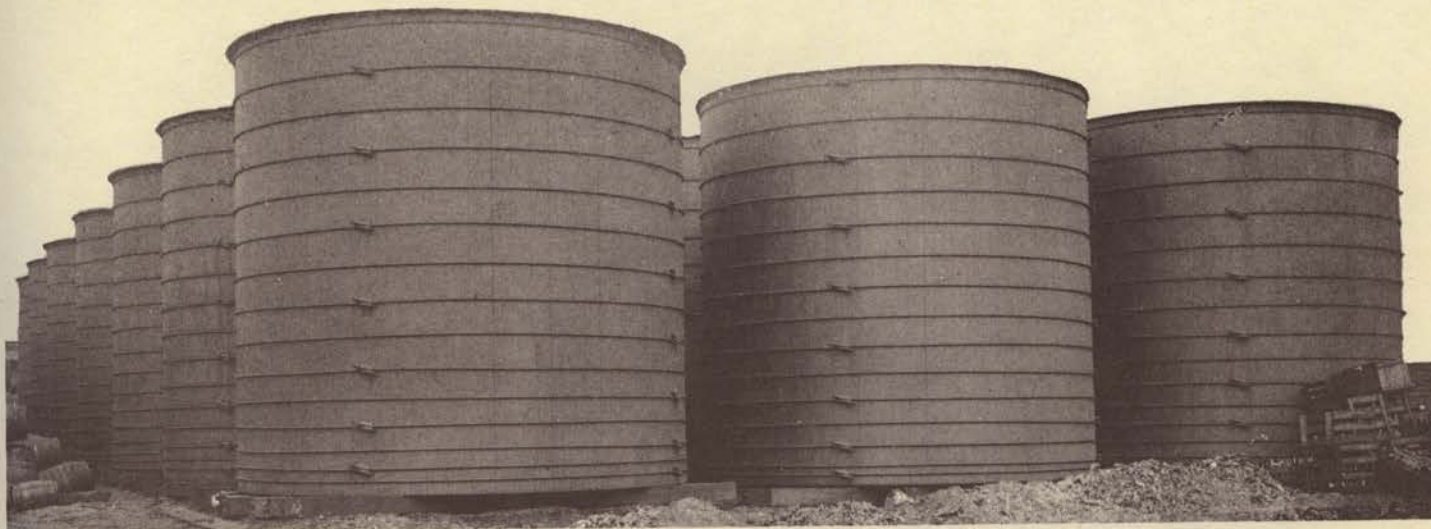
Wood tanks have been identified with the brewing industry practically since its inception. So successfully have they served, that comparatively few changes have been made in their design and construction throughout the history of the industry. We have records of installations which have been in use for over 55 years and are still in excellent condition.

Brewery tanks are furnished in all types. The vertical double headed, the horizontal double headed, oval, and even rectangular shapes are all in extensive use. These tanks are built to hold limited pressures where necessary.

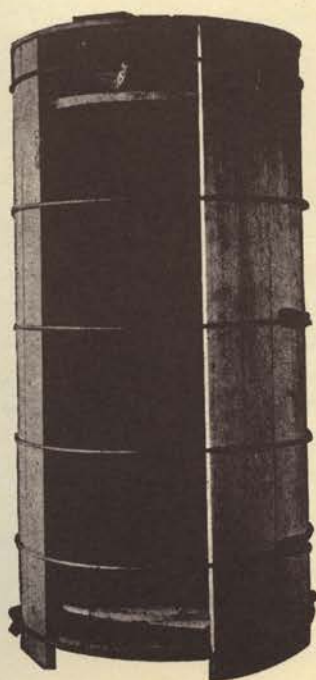




# VINEGAR STORAGE TANKS



Horizontal Vinegar or Acid Tank Car



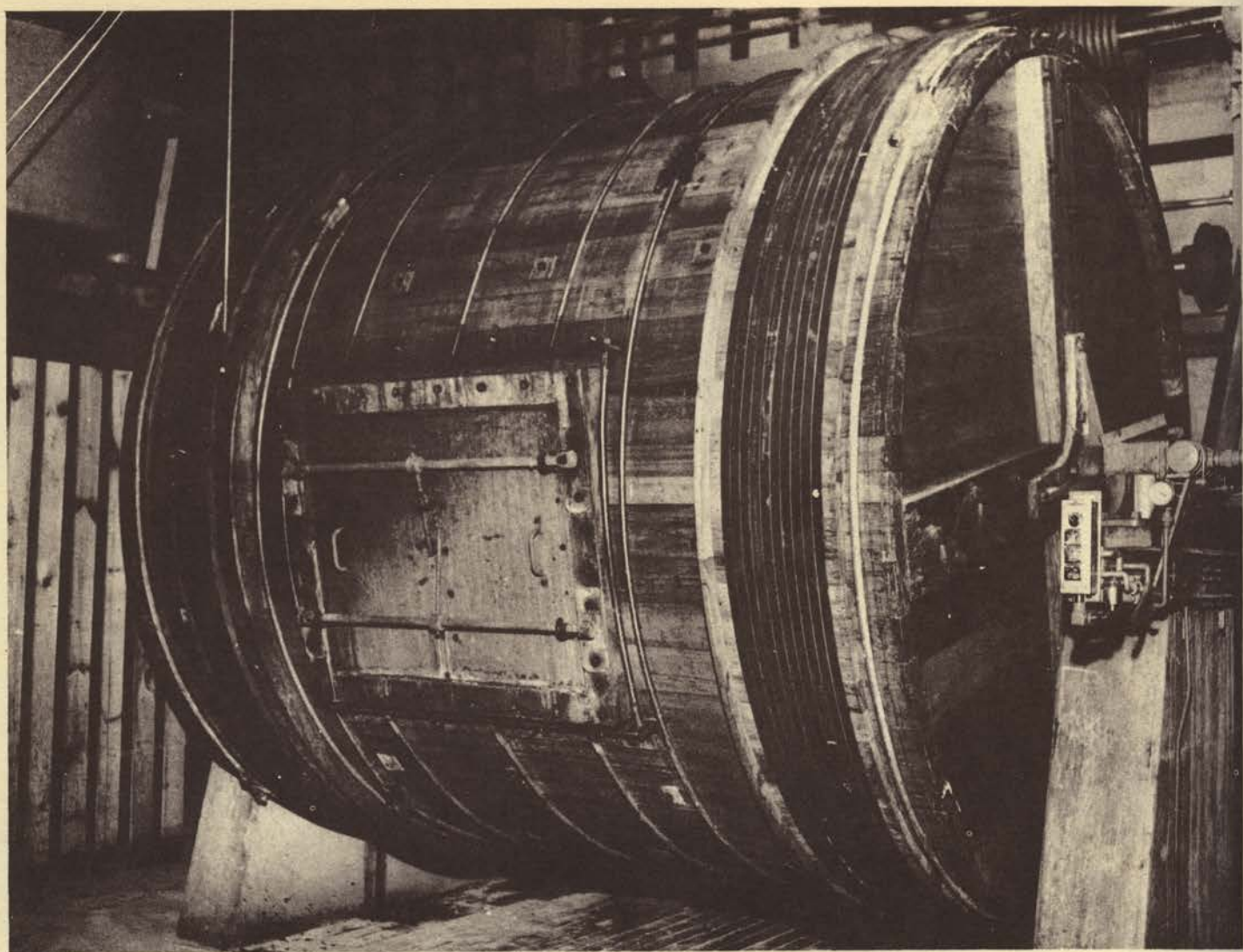
Vinegar Generator

## Vinegar, Pickles, Olives and Cider

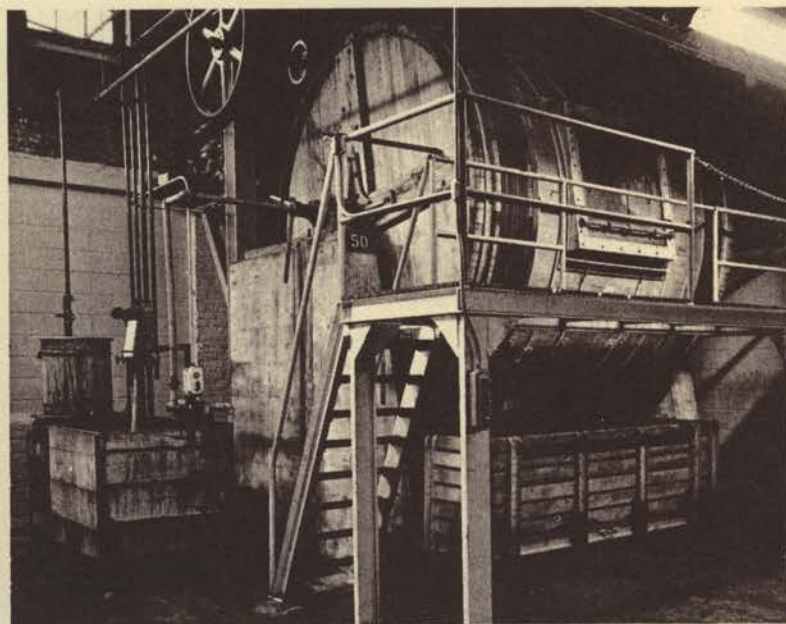
These foods are processed and stored almost exclusively in wood tanks. The acetic acid of vinegar has no deleterious effect on wood nor does brine in which pickles are packed. The brine and low concentration of lactic acid used in olive processing does not affect the wood adversely. Service of more than 30 years is expected from tanks processing these foods while records show tanks which have been in constant use for more than 50 years. While Douglas fir may be preferred for distilled vinegar tanks, much redwood is used for fermented vinegar tanks.



# TANNERY EQUIPMENT



**10' 6" Dia. Drum — 15,000 Lb. Capacity**

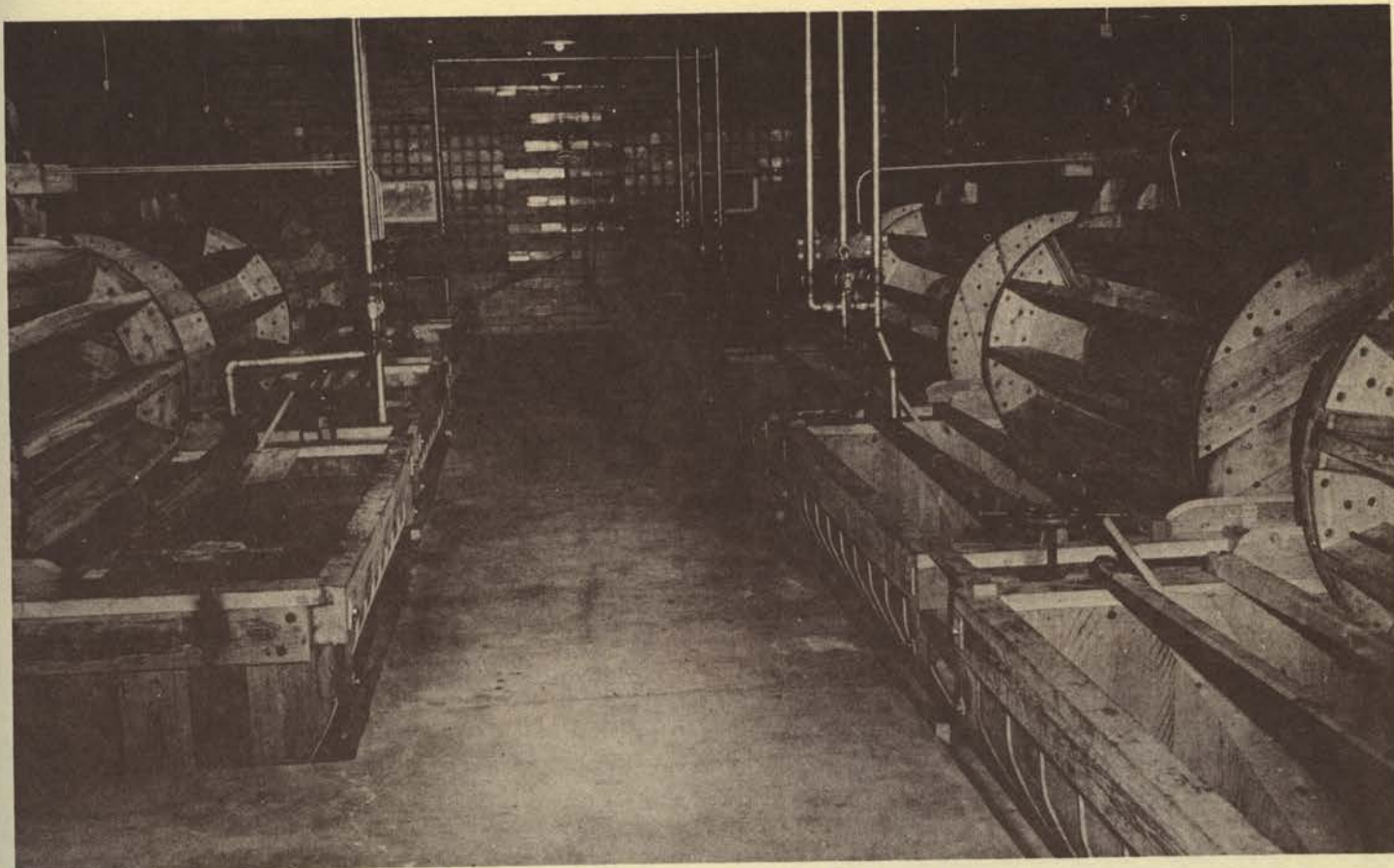


**10' 0" Dia.— Drum With Dump Truck**

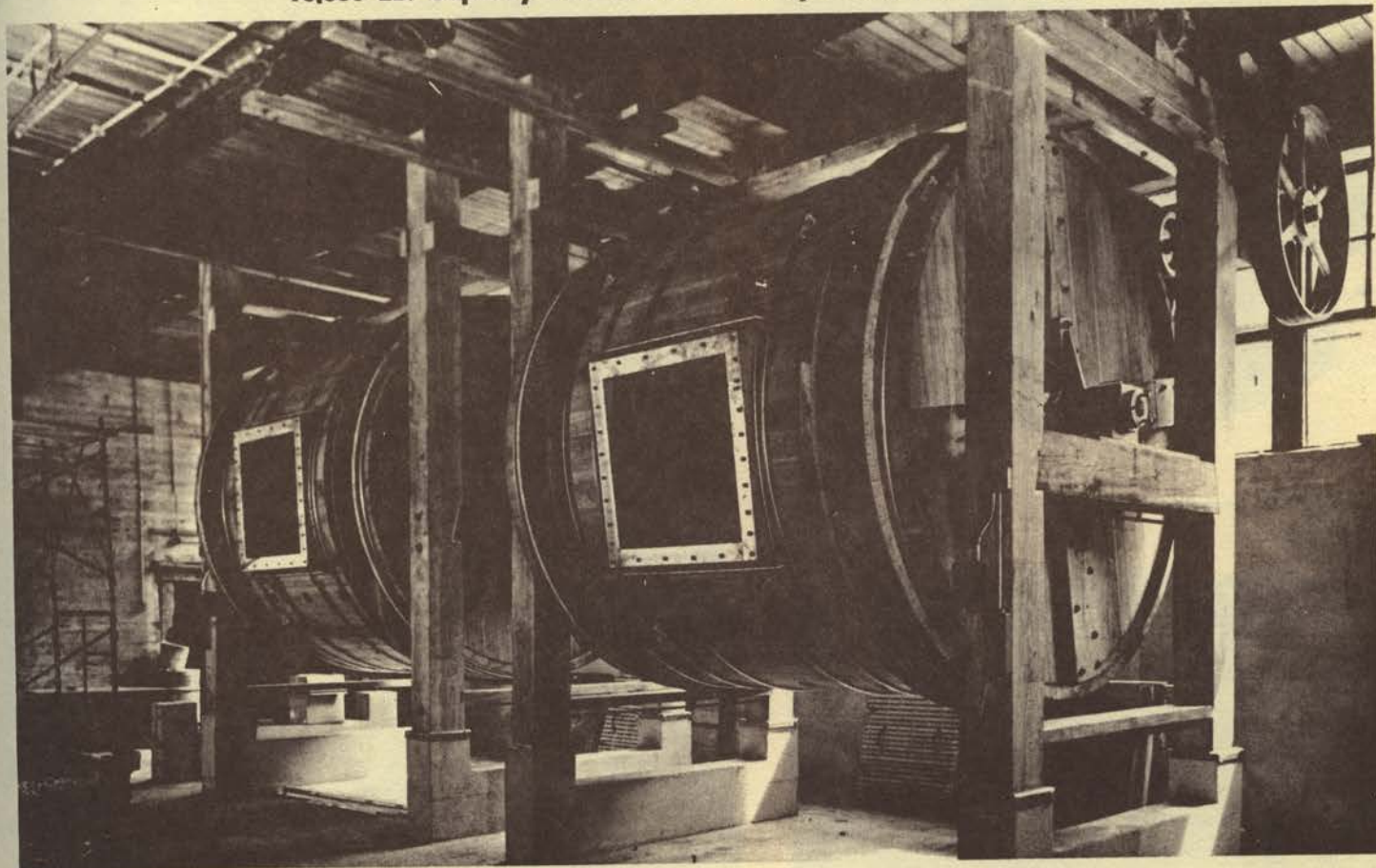
## **Tanneries**

Revolving wood drums and half round vats which are normally equipped with paddle wheels are used extensively in tanneries throughout the country during the process of making leather. Tanners of leather have used wood for a long time because it is a material capable of resisting chemical action, will not damage the leather by abrasion, will retain heat generated by friction and will withstand mechanical wear and deterioration which may be caused by the use of mild alkalis or various salts and acids. Damp, warm, cold and at times stagnant conditions within the tanneries make it essential that a species of wood highly resistant to decay be utilized.





**10,000 Lb. Capacity Vats With Individually Driven Paddle Wheels**



**Large Tan Drums Mounted on Wood Frames and Concrete Piers**



## COMBINATION CONCRETE BOTTOM AND WOOD STAVE CONSTRUCTION

This type of construction has been in general use for several years but the demand for large installations during the war period has developed improved packing compounds that seal the wood staves to the concrete bottom.

These later installations have been practical, efficient and economical particularly on tanks of larger diameter.

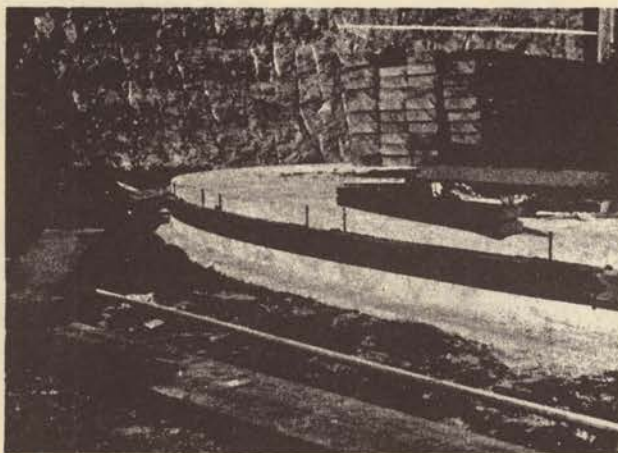
It has become the general practice to use this construction not only for large diameter tanks but particularly where a sloping or conical bottom is desired.

There are several advantages in this type of tank. Generally a large wood tank requires not only the wood bottom but foundation timbers and a concrete foundation.

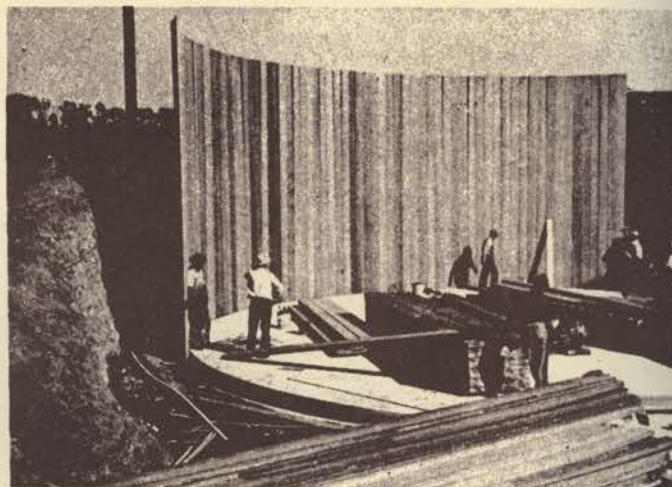
The combination type described above requires only the concrete slab foundation and the wood staves and steel hoops eliminating the wood bottom and foundation timbers. Therefore, the initial cost is usually less. In constructing sloping or conical bottoms of wood the problem of supporting the bottom is a major one and usually requires an elevated support of heavy timbers and circular segments to safely support the tank bottom.

If the tank can be placed on the ground it is usually more economical to use a *concrete bottom*. The ground can be shaped to the desired slope and the concrete poured directly on it with forms at the outer edge to form a curb for the staves.

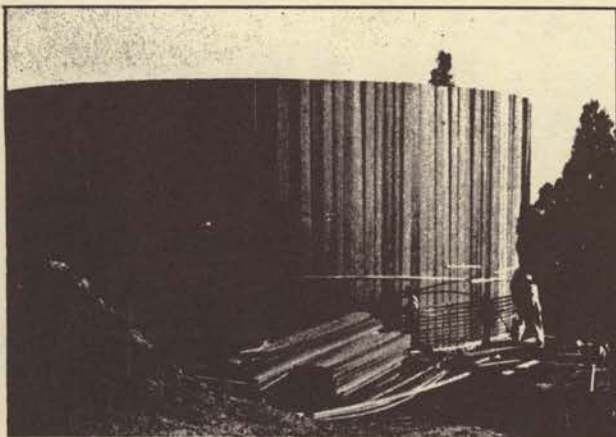
There are several variations on this type of construction. Therefore we would like to have all of the service requirements before making a recommendation. The purchaser may, if desired, install his own foundation according to our plans and specifications.



● Closeup of concrete slab showing Redwood segmented inserts.



● Setting staves in place.

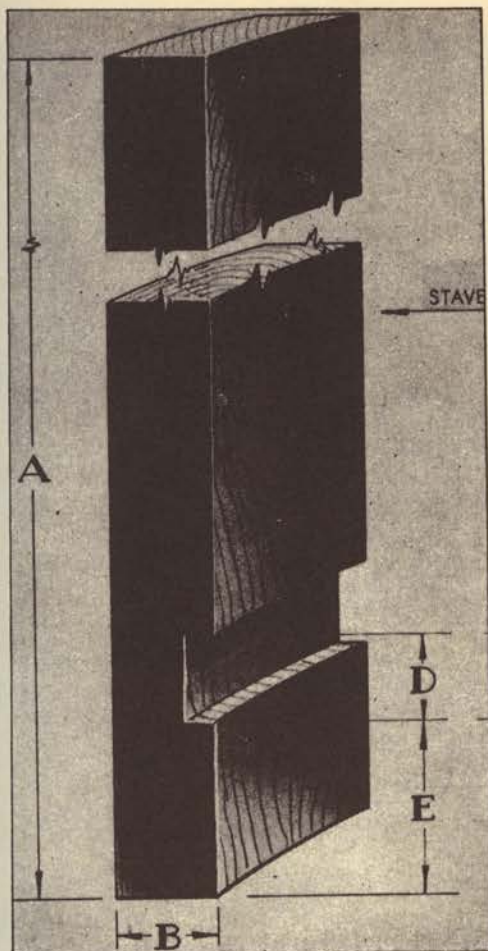


● Installing hoops on tank.



● Completed tank; 300,000 gallon, 52' diameter x 20' stave height.

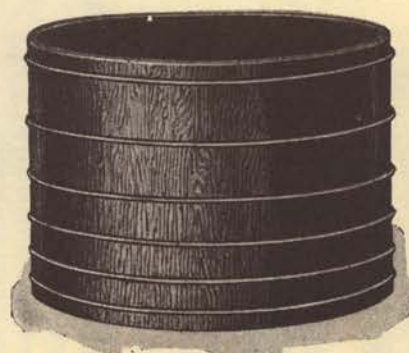
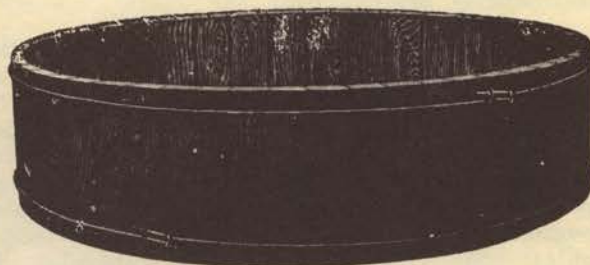
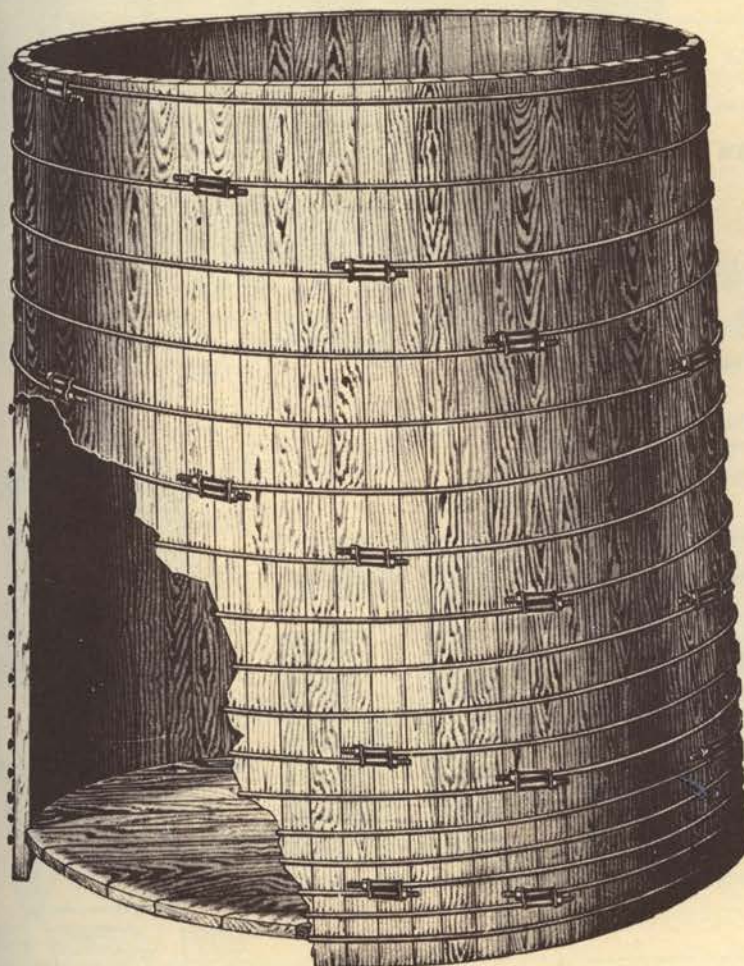




## STAVE AND BOTTOM TABLE

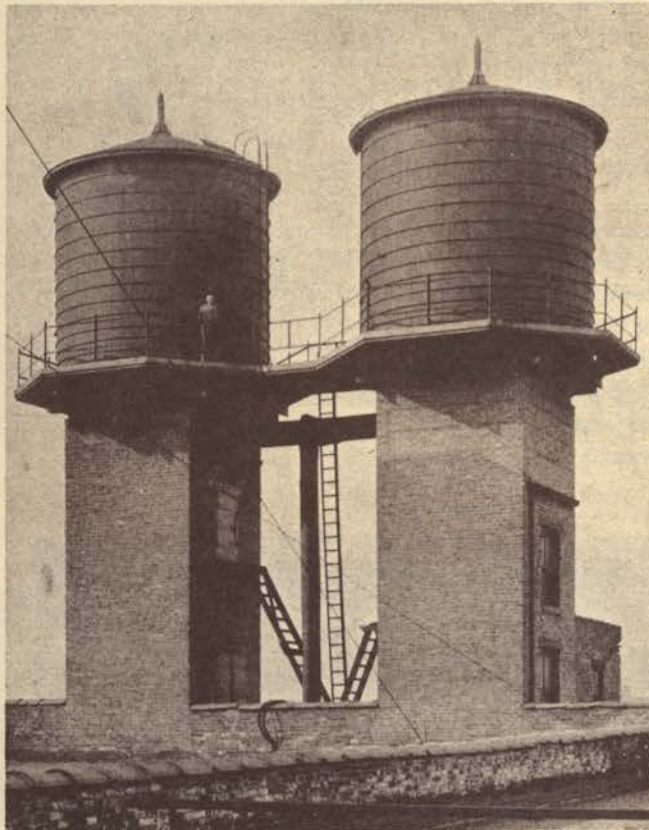
TABLE OF DIMENSIONS

ITEM	SPECIFICATIONS	RO. SIZE LUMBER USED		
		2"	3"	4"
A	Length of Finished Stave	1" less than nominal length		
B	Thickness of Stave	1 5/8"	2 5/8"	3 5/8"
C	Depth of Croze	1/2"	3/4"	3/4"
D	Width of Croze	1 1/2"	2 1/2"	3 1/2"
E	Length of Chime	3"	4"	5"
F	Depth of Inside Bottom Bevel	1/16"	1/16"	1/16"
G	Thickness of Beveled Edge	1 1/2"	2 1/2"	3 1/2"
H	Depth of Lower Bottom Bevel	3/16"	3/16"	3/16"
J	Length of Inside Bottom Bevel	1"	1"	1"
K	Length of Lower Bottom Bevel	1 1/2"	1 1/2"	1 1/2"
L	Depth of Dowel Center	7/8"	1 3/8"	1 7/8"
M	Thickness of Bottom	1 3/4"	2 3/4"	3 3/4"



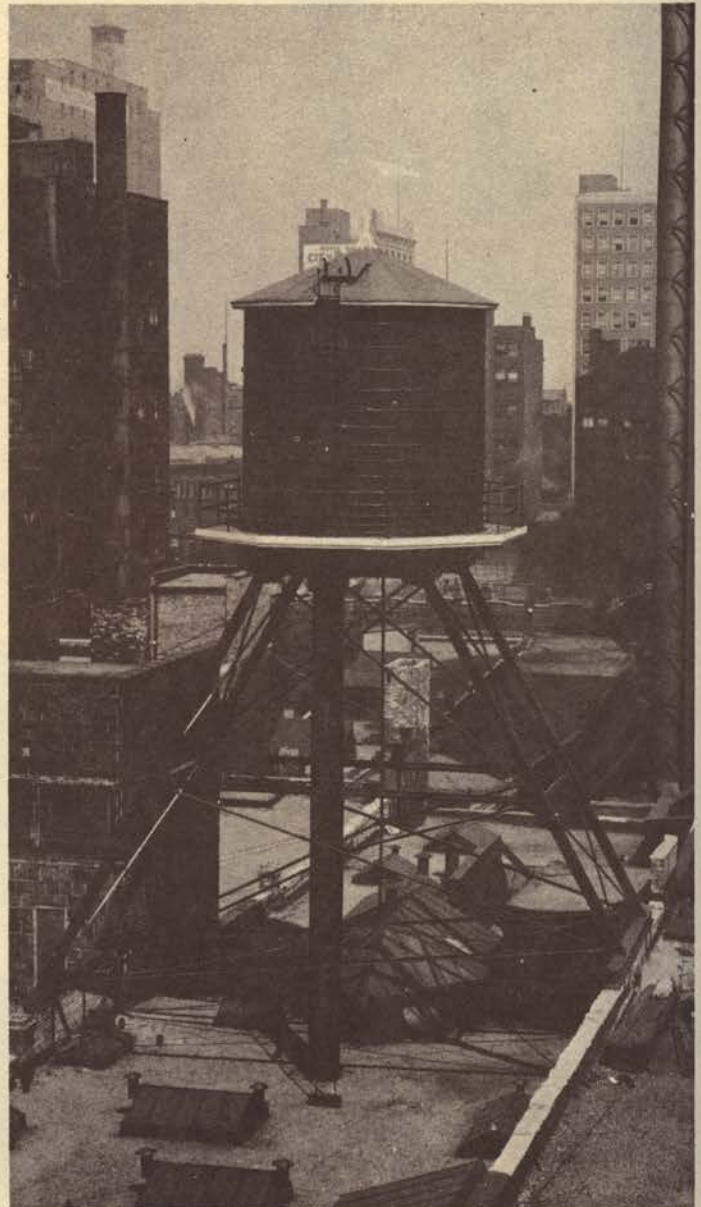


# GRAVITY TANKS



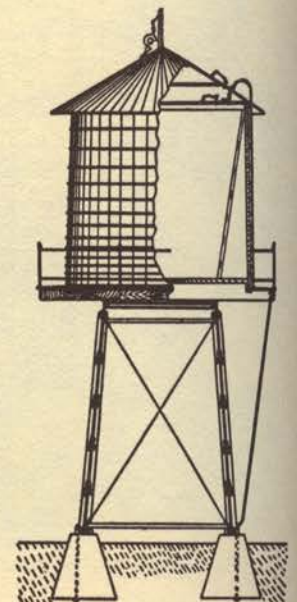
Redwood tanks for this service average 25 years of life. The tank is in continuous service all this time—no interruptions. These factors represent considerable savings over the years.

All our Gravity Tanks are constructed according to the specifications of all the Factory Mutual Fire Insurance Co., or other regulations of the various boards of fire underwriters. The complete tank equipment of a Gravity Tank in addition, calls for round adjustable hoops with heavy mallable iron lugs and hexagon nuts, flat and conical covers inside wood ladders, outside steel ladder, conical roof covered with No. 55 ruberoid.



Our customer never has to be without fire protection to paint this tank. A wood tank is painted occasionally on the outside for the sake of appearance only.

Net Capacity Gallons	Gross Capacity Gallons	Outside Diameter	Length of Stave	No. Round Hoops	Total Weight Tank Emp.	Total Weight Tank Full
10,000	11,294	13 ft. 6 in.	12 ft. 0 in.	4- 7/8" & 5-3/4"	8300#	102300#
12,000	13,289	13 ft. 6 in.	14 ft. 0 in.	6- 7/8" & 5-3/4"	9200#	120000#
15,000	16,520	15 ft. 0 in.	14 ft. 0 in.	7- 7/8" & 5-3/4"	10400#	148500#
20,000	21,700	16 ft. 0 in.	16 ft. 0 in.	11- 7/8" & 5-3/4"	12500#	193000#
25,000	27,665	18 ft. 0 in.	16 ft. 0 in.	12- 7/8" & 5-3/4"	14700#	245300#
30,000	32,152	18 ft. 3 in.	18 ft. 0 in.	16- 7/8" & 4-3/4"	17500#	285500#
35,000	37,830	19 ft. 9 in.	18 ft. 0 in.	13-1" & 4-7/8"	18100#	334200#
40,000	43,280	20 ft. 0 in.	20 ft. 0 in.	17-1" & 4-7/8"	20700#	383000#
50,000	53,848	22 ft. 3 in.	20 ft. 0 in.	19-1" & 4-7/8"	24700#	474000#
60,000	65,567	24 ft. 6 in.	20 ft. 0 in.	17-1 1/8" & 4-1"	27900#	573000#
75,000	80,760	24 ft. 9 in.	24 ft. 0 in.	24-1 1/8" & 4-1"	34200#	706500#
100,000	107,670	28 ft. 6 in.	24 ft. 0 in.	29-1 1/8" & 4-1"	38900#	940000#







...Low-cost insurance for longer tank life. Utilizes aluminum or aluminized sheet metal, depending on size of dome.

### HIGHLIGHTS APPEARANCE OF WOOD TANKS

Dome immediately adds smarter, modern lines to all wood tanks... beautifies with lasting, gleaming finish.

### OFFERS EXTRA FIRE PROTECTION

Dome is highly fire resistant... approved by United States Board of Fire Underwriters.

### MAKES ACCESS TO TANK EASIER

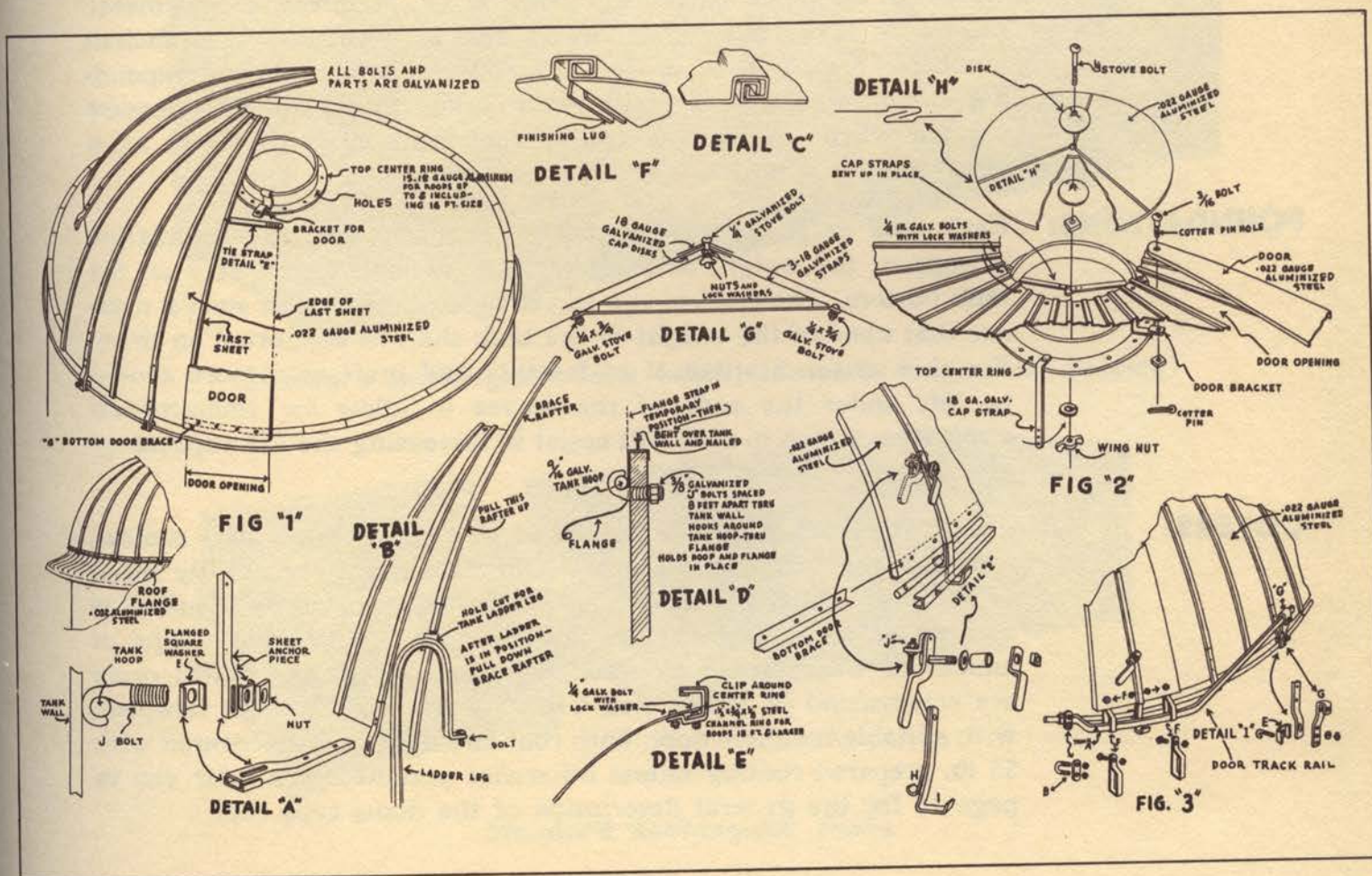
Dome's convenient sliding-door ends risky climbing through a small roof hatch. Slide open and step safely from ladder into tank.

### INCREASES LIFE SPAN OF TANK

Dome acts as an insulator. Reflects heat in summer, eliminating danger of drying out above water level. Allows condensation to escape in winter when water is heated.

### STORM-PROOF AND WEATHER RESISTANT

Dome adds to the life of the tank. No corrosion after many years of exposure. Special patented interlocking joints make Dome the strongest self-supporting dome roof available anywhere. Assures maximum protection from rain, snow, and birds.





# WOOD TANK SPECIFICATIONS

- MATERIAL:** All staves and bottoms are made from clear "tank grade" straight grained, properly seasoned lumber, free from sap-wood, pitch, splits, rot, dead-wood, or other defects that might impair their strength or durability.
- BOTTOM:** Bottom planks are surfaced on four sides, cut to a true circle and accurately chamfered to make a proper fit with the croze in the staves. All bottom pieces are furnished in one piece without a splice, where the diameter of the tank does not exceed 24 feet. Lengths over 24 feet are properly spliced and the joints are staggered to insure absolute water-tightness. Bottom pieces are bored for dowels in the center edge of the board, properly spaced, with wood dowels provided.
- STAVES:** All staves are milled with a concave and convex surface and to true radial lines on the edges and are provided with a properly designed and accurately cut croze to provide a proper drive fit with the bottom boards.
- HOOPS:** All hoops usually consist of round mild steel rods complete with malleable iron draw-lugs and American Standard heavy hex nuts. However, hoops of galvanized steel, brass, stainless, monel metal, plastic or lead covered, or others can be furnished. A sufficient number of hoops of the proper diameter and bent to the corresponding circumference of the tank are supplied to sustain the pressure exerted when the tank is full. Calculations shall be based on a safety factor of no less than four to one.
- FOUNDATIONS:** Each tank must be provided with a properly designed foundation to support the weight of the tank and its contents entirely on the tank bottom. The ends of the staves must hang free in such a manner that none of the weight of the tank shall be supported on them. For this reason a space of at least 1" and preferably more should be left under the ends of the staves to allow for sufficient air circulation which in turn will assist in increasing the life expectancy of the tank.
- COVERS:** Standard tank covers are furnished in four designs: flat, conical, hip, and aluminized dome types. Our flat covers are usually made of 1" durable Red Cedar shiplap properly supported by a sufficient number of cover joists which are furnished in the same type of lumber of which the tank itself is to be made. Our conical roofs are constructed of either Red Cedar or Redwood boards complete with suitable manhole door, both roof and door usually covered with 55 lb. prepared roofing unless otherwise specified. We refer you to page 13 for the general description of the dome type roof.



# RECTANGULAR TANKS

## DESIGN AND CONSTRUCTION

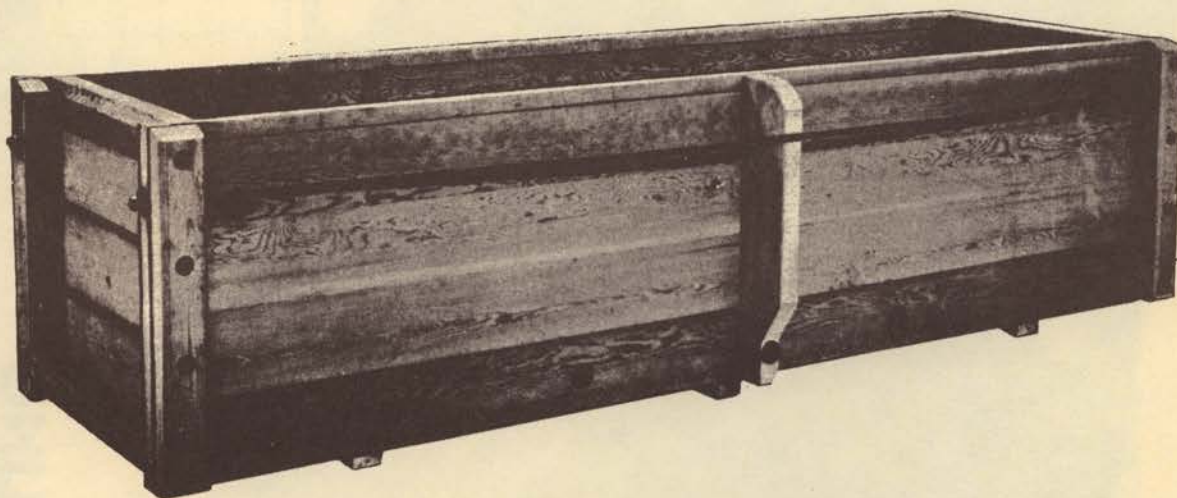
The design and construction of wooden rectangular tanks presents a number of interesting engineering problems. Exceptional care, in addition to practical knowledge, is required for their successful design and fabrication.

Various designs have been engineered by wood tank manufacturers with the intention of standardizing the construction as much as possible. However, before deciding on any definite type of construction, it is usually a good plan to first consider the service for which the tank is intended.

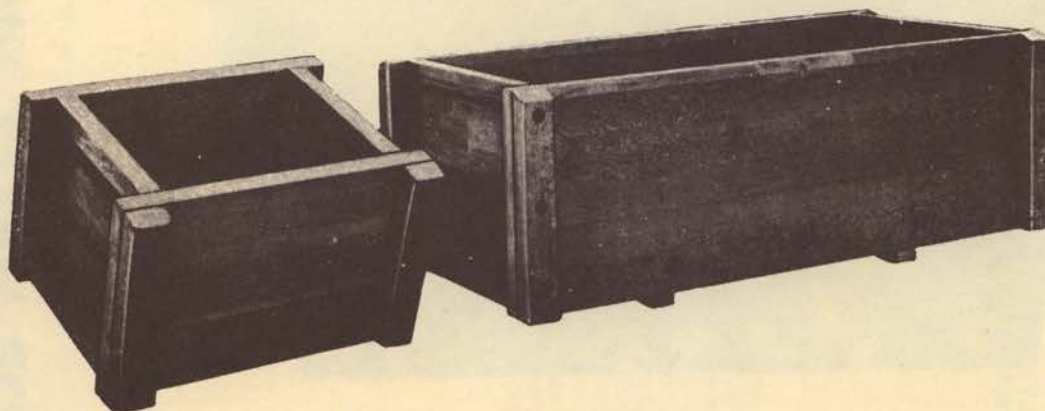
Rectangular tanks built for light service, or to contain water only, present an entirely different problem from those constructed to handle a hot, corrosive liquid.

Furthermore, rectangular wood tanks often must be designed to hold highly corrosive liquids, and also stand up under vibrations from steam coils or impacts of metals handled by crane or hoist. This would destroy any tank not specifically built for that purpose. With this in mind we have developed several different types of construction, each of which has proved its worth in actual service.

After the design has been established, each tank must be individually engineered for location of tie rods, as well as the size and number of rods required to safely support and keep tight all of the many joints common to rectangular tank constructions. Allowances must be made for expansion and contraction in service, as well as for the normal compression of the wood used in the tank before it has been placed in service. For instance, water, either hot or cold, will swell any wooden tank, thus causing extra joint pressure. But some hot and cold solutions, even at low concentrations, have a dehydrating effect on wood, thus causing wood to shrink. In such cases it will be found necessary, from time to time, to tighten the rods with which all wood tanks are provided. The amount of tightening and the length of time necessary to keep tightening the rods will vary, depending upon the kind of lumber used, as well as the type and strength of chemicals contained in the tank. Tanks subject to such strenuous service often must be furnished with splined seams, with the spline and groove so designed that even when the seams of the tank are loose or slightly open, the spline will remain sufficiently tight to prevent the loss of contents before the rods can be tightened.

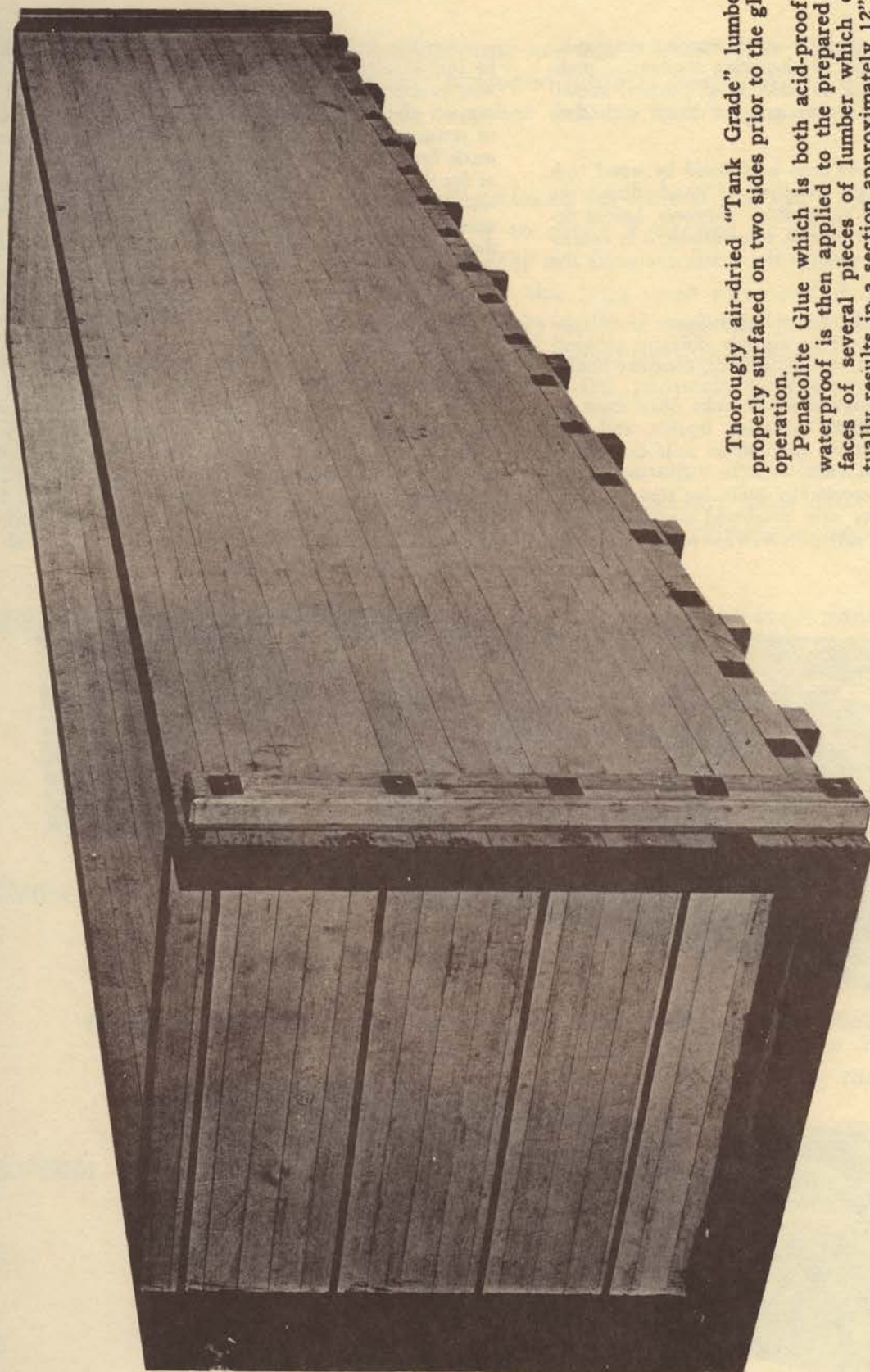


**Standard Rectangular Tank (with side rods to prevent bulging)**



**Standard Rectangular Tanks**





Thoroughly air-dried "Tank Grade" lumber is properly surfaced on two sides prior to the gluing operation.

Penacolite Glue which is both acid-proof and waterproof is then applied to the prepared surfaces of several pieces of lumber which eventually results in a section approximately 12" - 14" high. Each section is then drilled, re-surfaced, and glued resulting in a completed tank of specified dimensions.

The tank bottom is fabricated in a similar manner differing only in that the lumber is laid on edge and properly doweled before gluing.

## FOR METAL PICKLING AND PROCESSING



# RECTANGULAR TANKS (Continued)

## Number of U. S. Gallons in Rectangular Tanks

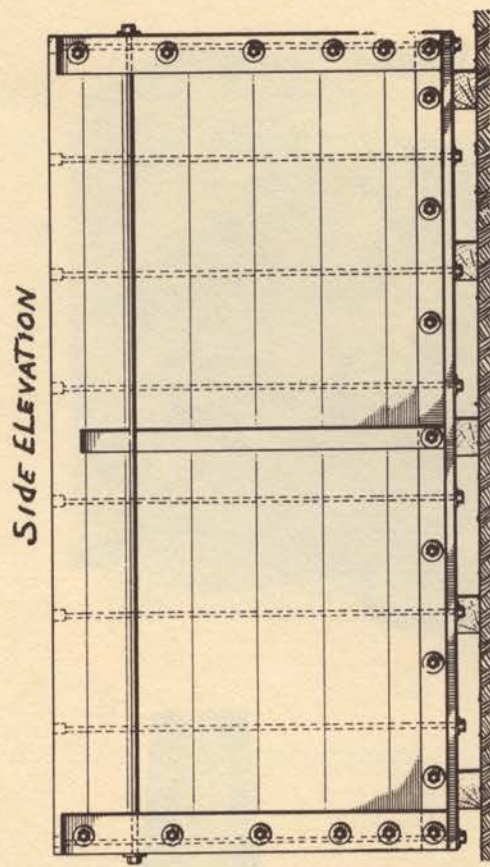
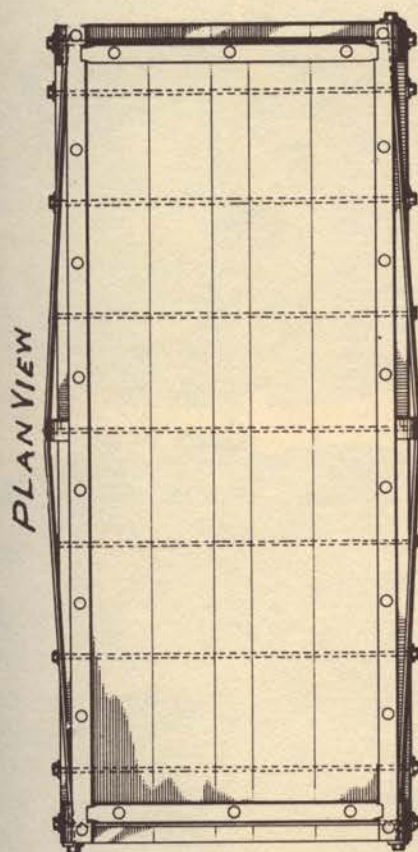
FOR ONE FOOT IN DEPTH

1 cu. ft. = 7.4805 gals.

Width in Feet	Length of Tank, in Feet											
	2	2.5	3	3.5	4	4.5	5	5.5	6	6.5	7	
2	29.92	37.40	44.88	52.36	59.84	67.32	74.81	82.29	89.77	97.25	104.73	
2.5	...	46.75	56.10	65.45	74.80	84.16	93.51	102.80	112.21	121.56	130.91	
3	...	...	67.32	78.54	89.77	100.99	112.21	123.43	134.65	145.87	157.09	
3.5	...	...	...	91.64	104.73	117.82	130.91	144.00	157.09	170.18	183.27	
4	...	...	...	...	119.69	134.65	149.61	164.57	179.53	194.49	209.45	
4.5	...	...	...	...	...	151.48	168.31	185.14	201.97	218.80	235.63	
5	...	...	...	...	...	...	187.01	205.71	224.41	243.11	261.82	
5.5	...	...	...	...	...	...	...	226.28	246.86	267.43	288.00	
6	...	...	...	...	...	...	...	...	269.30	291.74	314.18	
6.5	...	...	...	...	...	...	...	...	...	316.05	340.36	
7	...	...	...	...	...	...	...	...	...	...	366.54	

Width in Feet	Length of Tank, in Feet											
	7.5	8	8.5	9	9.5	10	10.5	11	11.5	12		
2	112.21	119.69	127.17	134.65	142.13	149.61	157.09	164.57	172.05	179.53		
2.5	140.26	149.61	158.96	168.31	177.66	187.01	196.36	205.71	215.06	224.41		
3	168.31	179.53	190.75	202.97	213.19	224.41	235.63	246.86	258.07	269.30		
3.5	196.36	209.45	222.54	235.63	248.73	261.82	274.90	288.00	301.09	314.18		
4	224.41	239.37	254.34	269.30	284.26	299.22	314.18	329.14	344.10	359.06		
4.5	252.47	269.30	286.13	302.96	319.79	336.62	353.45	370.28	387.11	403.94		
5	280.52	299.22	317.92	336.62	355.32	374.03	392.72	411.43	430.13	448.83		
5.5	308.57	329.14	349.71	370.28	390.85	411.43	432.00	452.57	473.14	493.71		
6	336.62	359.06	381.50	403.94	426.39	448.83	471.27	493.71	516.15	538.59		
6.5	364.67	388.98	413.30	437.60	461.92	486.23	510.54	534.85	559.16	583.47		
7	392.72	418.91	445.09	471.27	497.45	523.64	549.81	575.00	602.18	628.36		
7.5	420.78	448.83	476.88	504.93	532.98	561.04	589.08	617.14	645.19	673.24		
8	448.83	478.75	508.67	538.59	568.51	598.44	628.36	658.28	688.20	718.12		
8.5	478.75	508.67	538.59	568.51	598.44	628.36	658.28	688.20	718.12	748.04		
9	508.67	538.59	568.51	598.44	628.36	658.28	688.20	718.12	748.04	777.96		
9.5	538.59	568.51	598.44	628.36	658.28	688.20	718.12	748.04	777.96	807.89		
10	568.51	598.44	628.36	658.28	688.20	718.12	748.04	777.96	807.89	837.81		
10.5	598.44	628.36	658.28	688.20	718.12	748.04	777.96	807.89	837.81	867.73		
11	628.36	658.28	688.20	718.12	748.04	777.96	807.89	837.81	867.73	897.65		
11.5	658.28	688.20	718.12	748.04	777.96	807.89	837.81	867.73	897.65	927.57		
12	688.20	718.12	748.04	777.96	807.89	837.81	867.73	897.65	927.57	957.49		

To find weight of water in pounds at 62° F. multiply number of gallons by 8 1/3.  
**EXAMPLE.**—To find number of gallons in a rectangular tank that is 7.5 ft. by 10 ft., the water being 4 ft. deep: Look in extreme left-hand column for 7.5 and opposite to this in column headed "10" read 561.04, which being multiplied by 4, the depth of water in the tank, gives 2244.2, the number of gallons required.

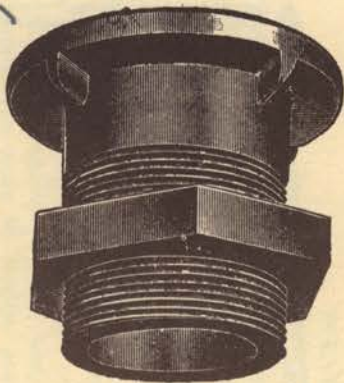
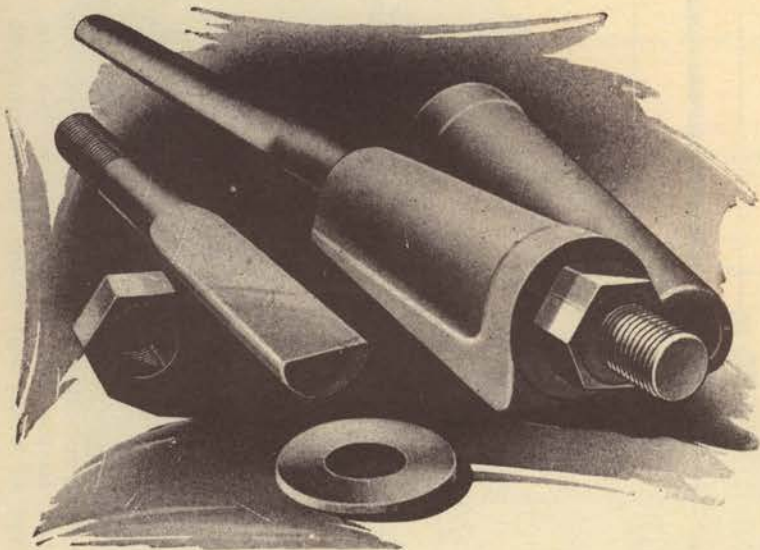


In selecting lumber for use in a rectangular tank the paramount consideration should be a specie of lumber, which will offer the best service for the conditions under which the tank is to be used. For this reason no claims are made for any specific specie of wood as being best adapted for all purposes. After a thorough study of the requirements of each individual job we recommend, to the best of our ability, the particular type of wood best suited for the purpose.



# MISCELLANEOUS PRODUCTS

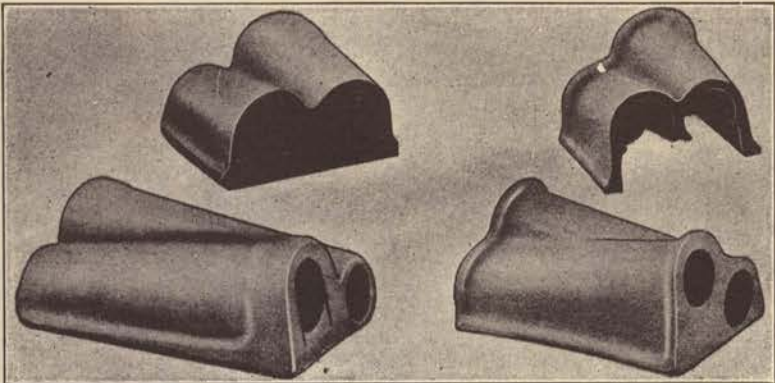
## Half Round Hoops



FLANGED OUTLETS  
AVAILABLE IN CAST IRON,  
BRASS, MONEL, AND STAINLESS STEEL



## Lugs for Round Hoops



CAST IRON

MALLEABLE

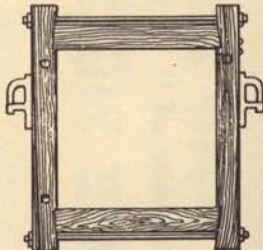
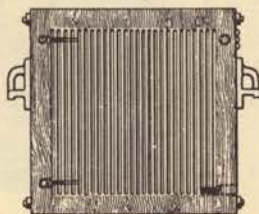
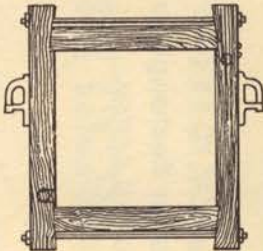
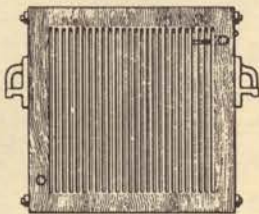
$\frac{1}{8}$ -inch  
 $\frac{1}{4}$ -inch  
 $\frac{3}{8}$ -inch

Diameter of Hoop  
 $\frac{1}{8}$ -inch  
1 -inch

$1\frac{1}{8}$  inch  
 $1\frac{1}{4}$  inch

Prices on application.

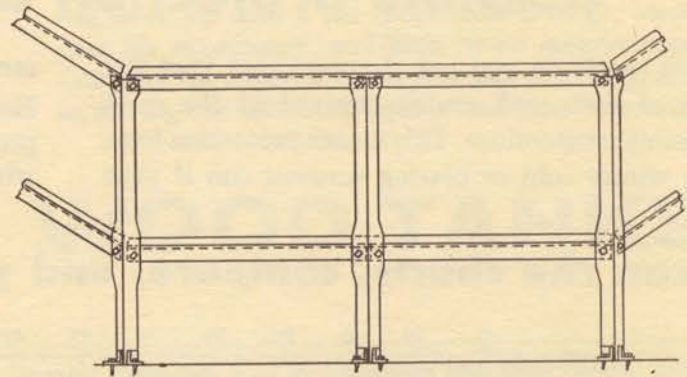
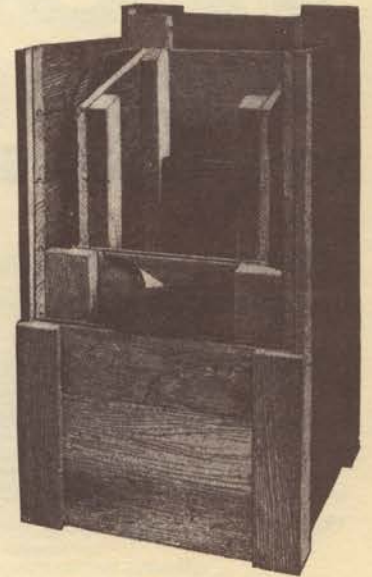
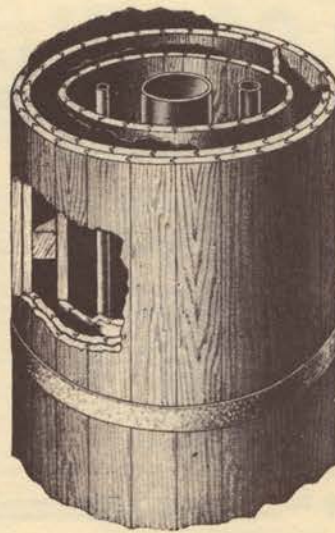
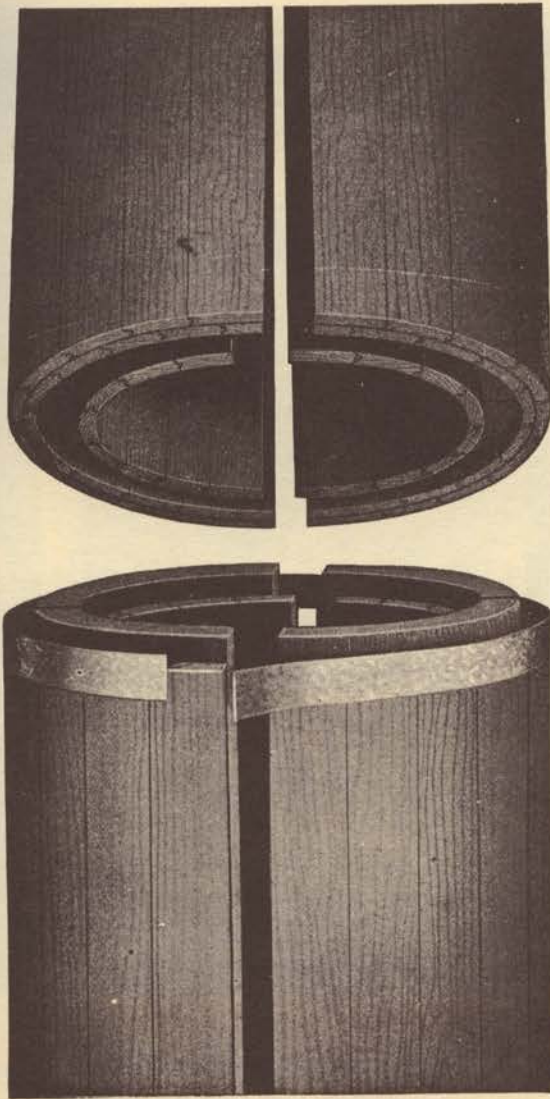
## WOOD PLUGS



WOOD FILTER PLATES AND FRAMES



## Frost-Proofing for Pipes



**HAND RAILINGS**

These Railings are for protection on walkways around tanks. They are made of angle steel. We also specialize in walkways.

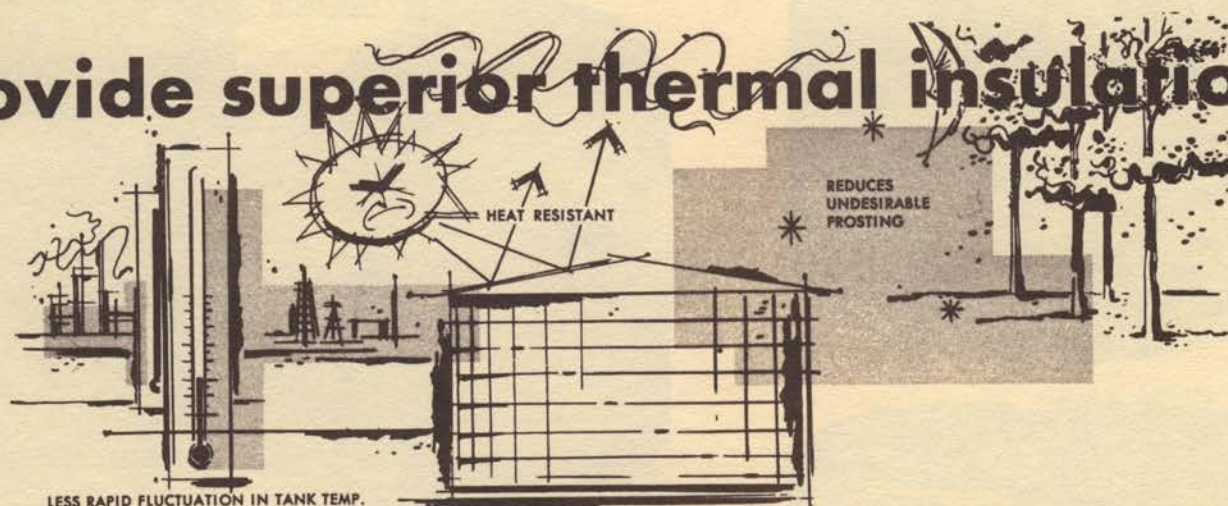


**Wooden Sinks**



# WOOD TANKS

provide superior thermal insulation



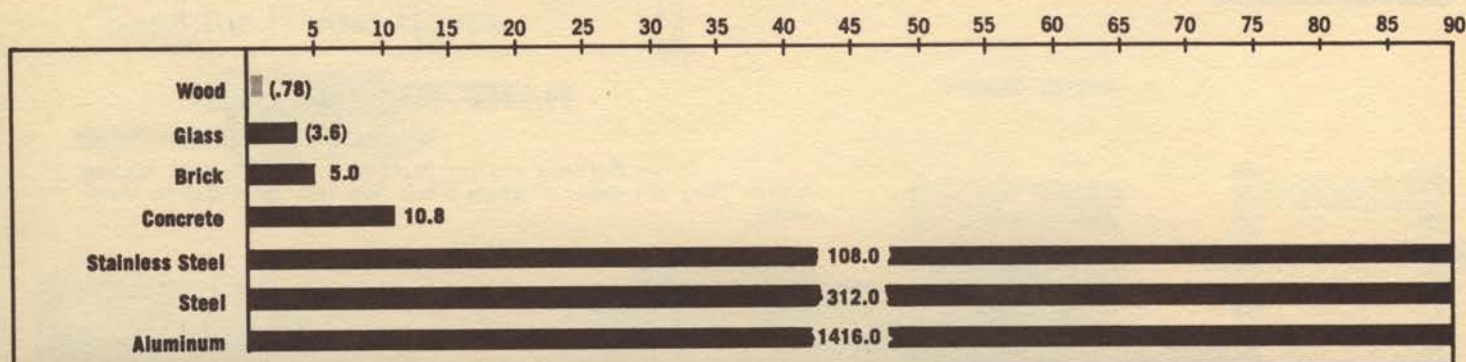
## Insulating properties of wood tanks give greatest possible protection against heat loss

Only with wood do you get the assurance that the contents of your tank are maintained at the most even possible temperature. This means protection from gripping winter cold or blazing summer sun if your

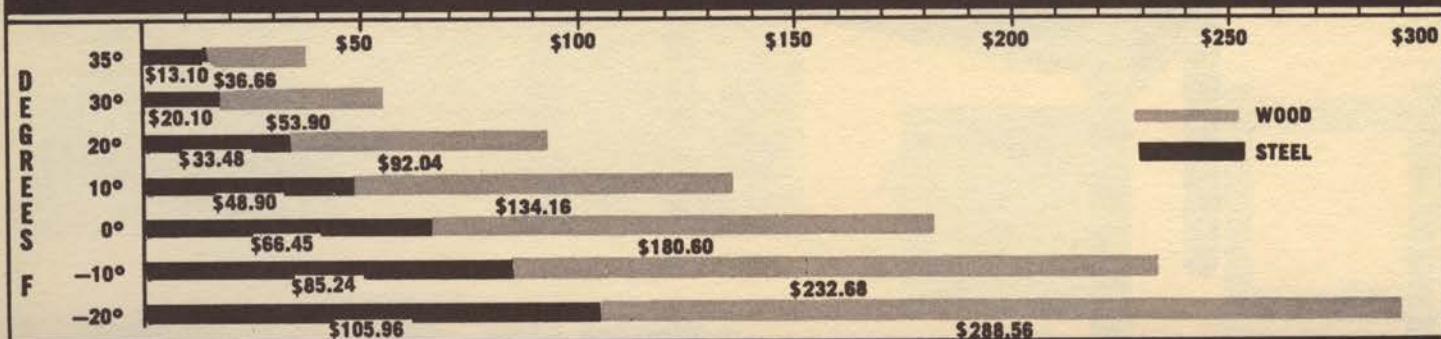
tank is to be located out of doors.

Because wood is its own insulator, it is the natural product to use in processing any liquid or chemical where heat loss is a significant factor.

## Scan the charts, compare, and you'll choose a wood tank



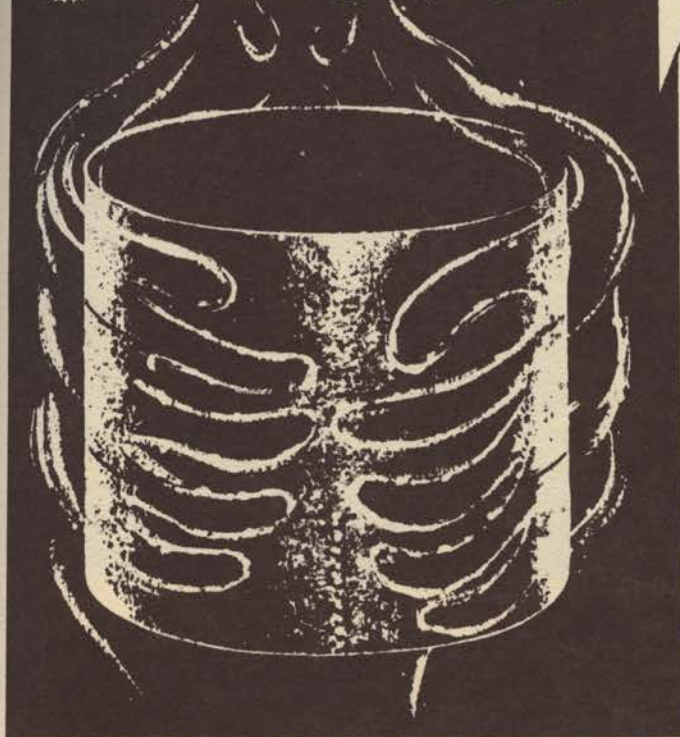
Conductivity of various materials commonly used in tank construction in K values (BTU per hr., per square foot, per F°, per inch of thickness).



Monthly Dollar Savings, wood tanks vs. steel tanks in heating 50,000 water tanks (using a common heating source), at various outside air temperatures (tank water 40°F.).



# CORROSION



**costs American Industry  
\$7,000,000,000<sup>00</sup>  
annually\*...**

**Is CORROSION One of Your Major Processing and Storage Problems? Then WOOD TANKS will save you money....**

... Because WOOD TANKS give superior *natural* protection against the corrosive action of most Acids and Alkaline Solutions. Without the use of expensive liners or coatings, WOOD TANKS also protect against the action of organic solvents, sulphur compounds, fluorides, organic acids, industrial wastes, salt water, water, and other corrosive solutions and gases.

Your maintenance and replacement costs will be drastically reduced with WOOD TANKS in almost every industrial use where non-corrodable tanks are required. This means significant savings in processes involving chemical solutions with a pH range from 2 to 11, because of long life expectancy, and little or no maintenance cost. Compare the superior life expectancy of WOOD TANKS in storing the following liquids, and you'll choose

**You save by using WOOD TANKS for other corrosive chemical solutions, too, such as:**

Aliphatic Alcohols  
& Fats  
Aliphatic Alcohol  
Sulphinate  
Barium Chloride  
Benzene  
Bleaching Lyes  
(Sodium Chlorite)  
(Calcium Chlorite)  
Boric Acid  
Calcium Sulphate  
Carbon Disulfide  
Carbon Tetrachloride  
Cresols  
Fatty Acids  
Formaldehyde

Glycerine  
Magnesium Sulphate  
Mineral and  
Vegetable Oils  
Oleic Acid  
Potassium Bromide  
Potassium Sulphate  
Silicate Solutions  
Sodium Cyanide  
Sodium Nitrate  
Sorbital Solutions  
Sorbos Solutions  
Stearic Acid  
Sulphur  
Zinc Chloride

**Typical corrosive chemicals used in processing and their relative effects upon commonly used tank materials.\***

	WOOD	STEEL	STAINLESS STEEL	ALUMINUM
Alums	Excellent	Poor	Poor	Excellent
Ammonia Chloride	Excellent	Poor	Fair	Fair
Aluminum Chloride	Excellent	Fair	Poor	Unusable
Formic Acid	Fair	Unusable	Poor	Unusable
Hydrobromic Acid(10%)	Excellent	Unusable	Unusable	Unusable
Hydrochloric Acid(10%)	Excellent	Unusable	Unusable	Unusable
Hydrofluoric Acid(10%)	Excellent	Excellent	Unusable	Unusable
Iron Chloride	Fair	Unusable	Unusable	Unusable
Magnesium Chloride	Excellent	Poor	Fair	Fair
Mercuric Chloride	Excellent	Unusable	Poor	Unusable
Sodium Bisulphate	Excellent	Fair	Fair	Unusable
Sodium Bisulphide	Excellent	Poor	Fair	Unusable
Sodium Chloride (Brine)	Excellent	Fair	Fair	Poor
Sulphur Dioxide Vapors	Excellent	Poor	Poor	Fair
Zinc Chloride	Excellent	Poor	Fair	Fair
Zinc Sulphate	Excellent	Poor	Unusable	Fair
Acetic Acid(Vinegar)	Excellent	Unusable	Poor	Excellent
Sulphuric Acid(10%)	Fair	Fair	Poor	Poor

\*Source: Corrosion Guide by Erich Rebal, 1954.



**IN THE TEXTILE,  
LAUNDRY & DRY  
CLEANING PLANTS**

Gravity Tanks  
Hot & Cold Water Tanks  
Brine & Starch Tanks  
Decarbonators &  
Degasifiers, Etc.  
Wooden Sinks  
Dye & Bleach Tubs, Etc.

**IN THE BREWERY &  
WINERY**

Fermentors  
Storage Tanks  
Pressure Tanks  
Yeast Tubs  
Sugar Mixing Tanks, Etc.

**ON THE FARM**

Cisterns  
Stock Tanks  
Spray Wagon Tanks, Etc.

**IN THE CHEMICAL  
INDUSTRY**

Round or Rectangular Tanks  
& Vats  
Fume Stacks  
Agitator Tanks  
Mixing Tanks  
Storage Tanks, Etc.

**IN THE METAL  
PROCESSING FIELD**

Acid Pickling Tanks  
Rinse Tanks  
Plating Tanks  
Lime Tanks

**IN THE TANNERY**

Tanning Drums  
Paddle Wheels  
Lime & Soak Tanks  
Extract Tanks  
Leach Tanks  
Color Wheels, Etc.

**IN THE FOOD  
PROCESSING INDUSTRY**

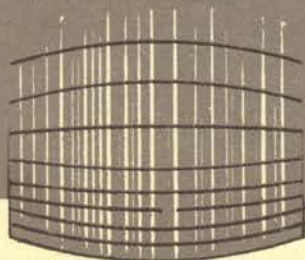
Cooking Tanks  
Vinegar Tanks &  
Generators  
Fruit Juice Storage Tanks  
Ham Curing Vats  
Processing Tanks of all  
types Etc.

**IN THE SOAP  
INDUSTRY**

Water Treatment Tanks  
Fatty Acid Tanks  
Rendering Tanks  
Settling Tanks  
Mixing Tanks, Etc.

**IN THE PAPER MILL**

Acid Tanks and Vats  
Head Boxes  
Stuff Chests  
Blow Pits  
Vomit Stacks



**JOHNSON & CARLSON**

848-864 EASTMAN STREET

Chicago, Illinois 60622

**Builders of Better Tanks and Vats Since 1893**